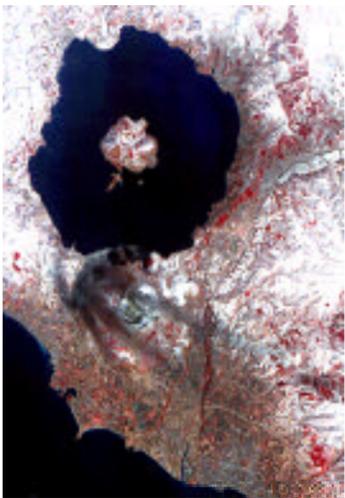


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Two JPL instruments help Terra monitor Earth



On April 3, JPL's ASTER instrument captured this visible-to-infrared image of the currently active Mt. Usu volcano in Japan, which lies on the south shore of Lake Toya. The three dark streaks starting on the northwest flank of the volcano are ash deposits from the plume three days earlier.

After a picture-perfect launch into space last December, NASA's premier Earth Observing System satellite, Terra, has completed on-orbit checkout and verification and is "open for business."

Two of the Terra instruments—the Multiangle Imaging SpectroRadiometer (MISR) and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)—are managed by JPL.

Terra, an international mission and part of NASA's Earth Sciences Enterprise, is opening a new window to the Earth and is providing daily information on the health of the planet. The first images from the five instruments aboard Terra were released April 19, and can be viewed at <http://photojournal.jpl.nasa.gov/new> and <http://www.jpl.nasa.gov/pictures/terra>.

Terra is the first satellite to monitor daily—and on a global scale—how the Earth's atmosphere, lands, oceans, solar radiation and life influence each other. Terra's wide array of measurements will give a comprehensive evaluation of the Earth as a system and will establish a new basis for long-term monitoring of the Earth's climate changes.

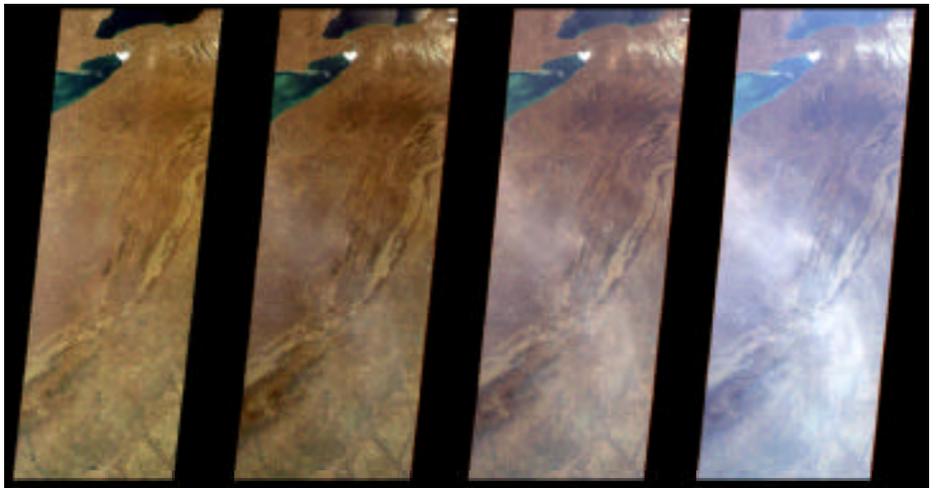
"Terra is measuring and documenting the Earth's vital signs, many of them for the first time," said Dr. Yoram Kaufman, Terra project scientist at NASA's Goddard Space Flight Center, Greenbelt, Md.

MISR Principal Investigator Dr. David J. Diner of JPL noted that the unique capabilities of the instrument include nine onboard cameras, which provide forward, downward and aftward views of the Earth. He said it takes seven minutes for any area to be imaged at all angles.

"The quality of the MISR images has been stunning," Diner said. "The images have a lot of detail, and I and the rest of the team are just thrilled at what we've seen. JPL has done a terrific job."

MISR's digital cameras capture images to a resolution as small as 275 meters (900 feet), or "about the size of a sports stadium," he said. The instrument produces images in four colors at every angle.

Beginning at the end of May, Diner said, routine postings of data and images will be released by the Atmospheric Sciences Data



Downward-looking view of the eastern United States, stretching from Lake Ontario to northern Georgia and spanning the Appalachian Mountains, as imaged by

MISR. As the slant angle increases, the line-of-sight through the atmosphere grows longer, and a pall of haze over the Appalachians becomes progressively more apparent.

Center at NASA's Langley Research Center (<http://eosweb.larc.nasa.gov>), where sample data have been posted so far. The first in-flight calibration of the instrument's data is expected to be completed around that time.

Among the new data MISR will provide for Earth scientists are partitioning of energy and carbon between the land surface and the atmosphere, and the regional and global impacts of different types of atmospheric particles and clouds on climate.

ASTER, a cooperative effort between NASA and Japan's Ministry of International Trade and Industry, serves as Terra's "zoom lens" and will obtain high-spatial-resolution global, regional and local images of the Earth in 14 colors, or spectral bands. Its primary goals are to characterize the Earth's surface; study processes that influence habitability at human scales, such as urbanization and desertification; and to monitor dynamic events, such as volcanic eruptions and advances or retreats of glaciers.

In that regard, Dr. Ann Kahle of JPL, the U.S. ASTER science team leader, noted that the instrument has imaged the currently active Mt. Usu volcano in Japan. Dark streaks from the April 3 image indicate ash deposits from the plume three days earlier. She said the ASTER team "will continually monitor the volcano at every opportunity to look for further signs of

unrest and to map damage" during its eruption.

ASTER consists of three separate subsystems, measuring in the infrared in the visible, shortwave and thermal spectral regions. Its spatial resolution of 15 meters (49 feet) and its stereo imaging allows scientists to determine elevation with an accuracy of 10 meters (33 feet). The ASTER science team is composed of members from the United States, Japan, France and Australia.

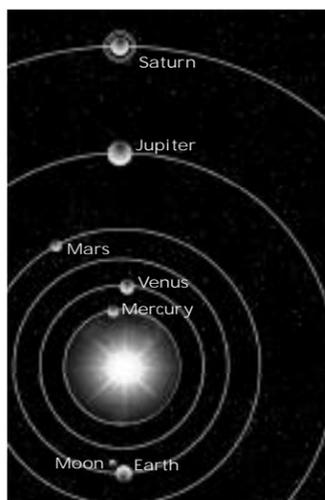
"Terra data, along with other measurements from surface-based and aircraft instruments, provide much-needed inputs for Earth science models," Kaufman said. "This ultimately will enable scientists to more accurately predict future climate change."

Many scientists believe that to successfully build predictive computer models of complex Earth interactions they must clearly understand global climatic processes and parameters. The Terra team estimates that the scientific community will complete the first Earth-system models making full use of Terra data by 2005.

The Earth Observing System series spacecraft are the cornerstone of NASA's Earth Science Enterprise, a long-term, coordinated research effort to study the Earth as a global system and the effects of natural and human-induced changes on the global environment.

Rare planetary alignment coming in May, but will be tough to see

By Gia Scafidi



Frank Scuratano

Graphic shows the expected alignment of planets on May 5.

For the first time in 38 years, the Earth, the moon and all five naked-eye planets (Mercury, Venus, Mars, Jupiter and Saturn)

will come into approximate alignment with the sun on May 5. The celestial phenomenon is expected to take place at 1:08 a.m. PDT.

According to JPL astronomer Dr. Don Yeomans, the same planets and the Sun (but not the moon) are expected to become even closer on May 17 at 3:30 a.m. PDT.

Although it has been rumored that planetary tidal forces will cause Earthly disasters as a result of the proximity of the cosmic bodies, there is no scientific evidence to back such claims. In fact, scientists and researchers are certain that the alignment will have no discernible effect on the world whatsoever.

"Tidal force depends on distance

and mass—but especially distance," said John Mosley, an astronomer at the Griffith Observatory. "If all the planets were to align perfectly, their gravity would raise the ocean tides by one twenty-fifth of one millimeter." Tidal effects do not automatically multiply with a precise geometrical configuration.

Yeomans added, "A baseball held at arm's length would have a tidal effect millions of times stronger than does Mars at its closest."

Unfortunately, due to the Earth's position, we will not be able to see the planetary alignment. The Earth and the moon happen to be on the opposite side of the Sun from the other planets. Consequently, the

five naked-eye planets will be aligned in the direction of the Sun, making them impossible to see through the sun's glare.

However, the moon, Mars and Venus may be bright enough and far enough away from the sun to be detected in the sky. If so, Venus could be seen in the eastern dawn sky and the moon and Mars in the western sky right after sunset.

Although planetary alignments are unusual, they are not unheard of. Studies shows that various planetary groupings have taken place in 1962 and 1988. However, scientists believe that the next alignment comparable to the upcoming May 5 event will not happen again until March 20, 2675.

News Briefs



Dr. Myles Standish

Standish honored for astronomy

JPL astronomer DR. E. MYLES STANDISH has received the American Astronomical Society's Brouwer Award for excellence in dynamical astronomy.

The award cited Standish leading the development of the JPL planetary ephemerides, which provide international standards for spacecraft navigation, almanacs, historical astronomy, solar system tests of gravity theories, pulsar timing and quantitative studies of long-term solar system dynamics.

Standish, who came to JPL in 1972, has provided the planetary ephemerides to all JPL flight projects since the 1973 flight of Pioneer 10 to Jupiter. The JPL planetary ephemerides are used in the Astronomical Almanac, a widely used reference work for astronomers.

Standish earned bachelor's (1960) and master's (1962) degrees from Wesleyan University and a doctorate from Yale University in 1967, where he taught until joining JPL.

The award, the highest possible achievement for work in this area, honors Standish's career achievements and was recently bestowed by the society's Division of Dynamical Astronomy. He will be honored at the division's next meeting in spring 2001.

New Jupiter moon images released

Lava flows, cliffs and depressions from collapsed volcanic eruptions are seen in new images of Jupiter's moon Io, taken during the Galileo spacecraft's most recent flyby on Feb. 22.

A trio of newly released Galileo images of three of Jupiter's small moons are also available online.

All of the new moon images can be found at <http://www.jpl.nasa.gov/pictures/jovianmoons>.

The new Io pictures give scientists more information to help them in their ongoing quest to understand the rampant, fiery volcanic activity on Io and its similarities to past and present volcanism on Earth.

Images of Thebe, Amalthea and Metis—three of the planet's four innermost moons—show very irregular shapes on those bodies, indicating they've been bombarded by comets and asteroids. When these tiny moons are hit, dust is kicked off their surface, which ultimately contributes to the formation of the rings around Jupiter.

Solar system's largest volcano shown

A new image from JPL's Mars Global Surveyor spacecraft shows a close-up view across the summit of Olympus Mons, the largest volcano known in our solar system.

Olympus Mons is not an active volcano and the image shows that the area around the summit is covered by fine dust and pocked by small impact craters. It is roughly the height of three Mount Everests and is nearly 550 kilometers (340 miles) across. Despite its great height, the slopes of this volcano are only a few degrees—a person would not really climb Olympus Mons, but simply walk uphill toward its summit.

The Global Surveyor image is available at <http://mars.jpl.nasa.gov/mgs>.

911 is now JPL's emergency number

JPL's new emergency phone number is 911. Dialing the number connects Laboratory staff with the new dispatch center located in Building 310, the Emergency Services Facility, and will alert emergency response to medical/ambulance, fire/rescue, security violations and hazardous materials calls.

JPL Emergency Preparedness Administrator ERIC FULLER noted the features of the new computerized system:

- Emergency dispatch operators have taken an intensive, three-week state-certified 911 dispatch course.
- The 911 operator instantly receives the phone number, building and room number of the caller, and can simultaneously dispatch the needed resources while talking to the caller about the nature of the emergency.
- To assist callers, the operator has an electronic library of emergency situations; for example, "chest pains."

The computer will display a "procedures" prompt so the operator can direct the caller on what to do until help arrives. It also gives emergency staff instant connection to outside help.

Other information that can be displayed to the operator about the caller's location includes, for example, whether the area contains flight hardware or hazardous materials. The caller may also want rescue staff to know in advance of the victim's medical conditions such as heart disease, diabetes, etc. More information on this feature will be available soon.

"This 911 system is the latest in high-tech emergency systems and will greatly assist in on-Lab emergencies," Fuller said, adding that the dispatch center has redundant systems in case of failure.

There will be a Lab-wide distribution of 911 stickers to be placed on all telephones. For those who need stickers, contact Fuller at ext. 4-1091. The old 3-3333 emergency system number will still work but will not display caller address and will be removed sometime in the near future.

Non-polluting chip-stripper developed

JPL has co-developed a new robotic device that safely strips paint from the hulls of ships without polluting the environment.

The system could revolutionize paint removal in the shipping industry. Current sandblasting methods potentially can contaminate waters surrounding harbors.

JPL developed the new technology as a partner in the National Robotics Engineering Consortium, a NASA, industry and university partnership to develop new industrial products and services from technologies that help solve key problems and reinvigorate the U.S. robotics industry.

Dr. NEVILLE MARZWELL, who heads Advanced Concepts and Technology Innovations at JPL, manages the Lab's efforts in the consortium. Other partners are Carnegie Mellon University in Pittsburgh and UltraStrip Systems, Inc., Stuart, Fla.

The technology consists of an automated robotic device that is magnetized to the ship, a set of high-pressure jet streams, and a controller that helps the robot navigate along the surface of the ship. The water is filtered and then reused, while the paint residue is collected in a container and can then be disposed of safely. Using this method, no toxic dust or paint flakes are generated to pollute nearby areas or to be inhaled by system operators.

"Robotics technology developed at the various NASA centers has resulted in new products ranging from automated harvesting, coal mining, earth moving, and material transport to robotic inspection and repair for gas pipelines, and agricultural spraying, to name a few," said Marzwell.

Next blood drive coming in May

The next JPL/Red Cross blood drive will be held in von Kármán Auditorium May 16 from 10 a.m. to 4 p.m. and May 17 from 7 a.m. to 1 p.m.

Sign-up sheets will be available at Occupational Health Services, Building 310 and online at http://eis/medical/blood_form.html.

If you have not signed up ahead of time, or wish to change your appointment, call the Pasadena Red Cross at (626) 799-0841, ext. 630.

Clarification

An article in the April 14 issue of Universe on the Ulysses mission should have stated that JPL manages the mission, and that it is a joint venture between NASA and the European Space Agency. The spacecraft was built by Dornier Systems for the European Space Agency. The suite of instruments is evenly divided between NASA-funded and ESA member states-funded investigators.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. Call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the third Thursday of the month at noon in Building 167-111. Call Greg Hickey at ext. 4-0776.

Senior Caregivers Support Group—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. Call (626) 397-3110.

Saturday, April 29

Toying With Science—

The scientific principles of gravity and leverage, simple machines, human imagination and more will be explored at 2 p.m. in Caltech's Beckman Auditorium. Presented in collaboration with Pasadena's Kidspace Museum. Tickets are \$10 for adults, \$5 for children. For information, call (626) 395-4652.



Sunday, April 30

Chamber Music—The Coleman Chamber Ensemble Competition Winners Concert will be performed at 3:30 p.m. in Caltech's Ramo Auditorium. Tickets are \$10. For information, call (626) 395-4652.

Monday, May 1

Caltech Ballroom Dance Club—The first of a five-session class in beginning nightclub two-step will be held from 7:30 to 9 pm in the campus' Winnett Lounge. Cost: \$30. Refreshments and dance practice time are provided after class. Call Don at 626/791-3103.

JPL 2000 Lecture Series—Ken Jezek, director of the Byrd Polar Research Center at Ohio State University, will discuss the Antarctic Mapping Mission at noon in von Kármán Auditorium.

Tuesday, May 2

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-169.

Wednesday, May 3

Associated Retirees of JPL/Caltech Board—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Caltech Ballroom Dance Club—The first of a five-session class in beginning salsa will be held from 7:30 to 9 pm in the campus' Winnett Lounge. Cost: \$1 per lesson.

Refreshments and dance practice time are provided after class. Call Don at 626/791-3103.

"Images of the Early Universe"—Caltech physics professor Dr. Andrew Lange will give this free lecture at 8 p.m. in the campus' Beckman Auditorium. For information, call (626) 395-4652.

JPL Bicycle Club—Meeting at noon in the Building 167 cafeteria.

Thursday, May 4

JPL Gun Club—Meeting at noon in Building 183-328.

Friday, May 5

National Anxiety Disorders Screening Day—Licensed Clinical Social Worker Jane Berwick will present a seminar designed to help employees deal with issues such as fear, anxiety, stress, nervousness, worry and feeling overwhelmed. To be held at noon in the Building 167 conference room.

Fri., May 5–Sat., May 6

Capitol Steps—This group of current and former congressional staffers that performs musical satire on issues of the day will appear at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$32, \$28 and \$24. For information, call (626) 395-4652.

Saturday, May 6

Caltech Ballroom Dance Club—A free mid-term ballroom dance party with refreshments will be held from 8 p.m. until midnight in the dining area of Avery Center. Call Don at 626/791-3103.

Tuesday, May 9

JPL Stamp Club—Meeting at noon in Building 183-328.

Wednesday, May 10

AFS Quick Start Session for Windows NT—Jeff Sachs of Section 366 will provide an overview of the benefits of using the AFS distributed file system to manage your computer files, including setting up group space, accessing data, publishing Web pages, and more. At noon in the Building 167 conference room.

JPL Toastmasters Club—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. Call Mary Sue O'Brien at ext. 4-5090.

JPL 2000 Lecture Series—Shuttle Radar Topography Mission Project Scientist Dr. Mike Kobrick will speak at 11 a.m. in von Kármán Auditorium.

Music on the Mall—

The Jimmy Owens Jazz Ensemble will perform beginning at noon.



Friday, May 12

Finland: Land of Contrasts—This travel film will be shown at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. For information, call (626) 395-4652.

Fri., May 12–Sat., May 13

Spring Concert—The combined Caltech Glee Clubs and the Caltech-Occidental Chamber Orchestra will perform a program to be determined at 8 p.m. in Ramo Auditorium. For information, call (626) 395-4652.

SRTM astronauts salute Lab mission to map Earth in 3-D

By Mark Whalen

Shuttle Radar Topography Mission astronauts

Janice Voss, left, and Gerhard Thiele sign

autographs for JPL staff and visitors during

their April 20 visit to the Laboratory.



Bob Brown/JPL Photo

Five of the astronauts from the space shuttle crew that carried JPL's Shuttle Radar Topography Mission (SRTM) came to the Laboratory April 20 to revisit the highly successful project and salute those who made it happen.

After attending SRTM science briefings, Endeavour astronauts Dominic Gorie, Janet Kavandi, Kevin Kregel, Gerhard Thiele and Janice Voss met with and signed autographs for first-grade students from Andrew Jackson Elementary School in Altadena, who followed the mission from start to finish. The crew then presented an overflow audience in von Kármán Auditorium with a slide show and video of their 11-day flight in February, and later signed autographs for JPL staff in the mall.

(The sixth crew member, Mamoru Mohri of the Japanese Space Agency, has returned to Japan and did not attend.)

The huge amount of data returned from the mission represents a giant leap forward in our knowledge of Earth's surface. The mission has produced unrivaled 3-D images of the Earth's surface, which will be used for a wide variety of ecological, geological, meteorological, sociological and civil engineering projects affecting the lives of hundreds of millions of people for decades to come.

Kregel, the mission commander, presented JPL Director Dr. Edward Stone with a plaque of recognition. Later, he thanked JPL for the opportunity to fly the mission, telling the audience, "If it weren't for the smart people here thinking up missions like this, we wouldn't have a job."

The astronauts shared many breathtaking images from their journey, in which they witnessed 16 sunrises and sunsets daily. Included were sharp images of land features such as an impact crater in Quebec and Alaska's Aleutian Islands, as well as human structures such as the Egyptian pyramids.

SRTM Project Scientist Dr. Mike Kozick called the SRTM data "a national treasure." He noted that data from the mission filled 330 tapes, each of which took half an hour to complete. He said a single tape would hold enough data to map 3 million square kilometers (1.16 million square

miles), roughly the land surface area of India.

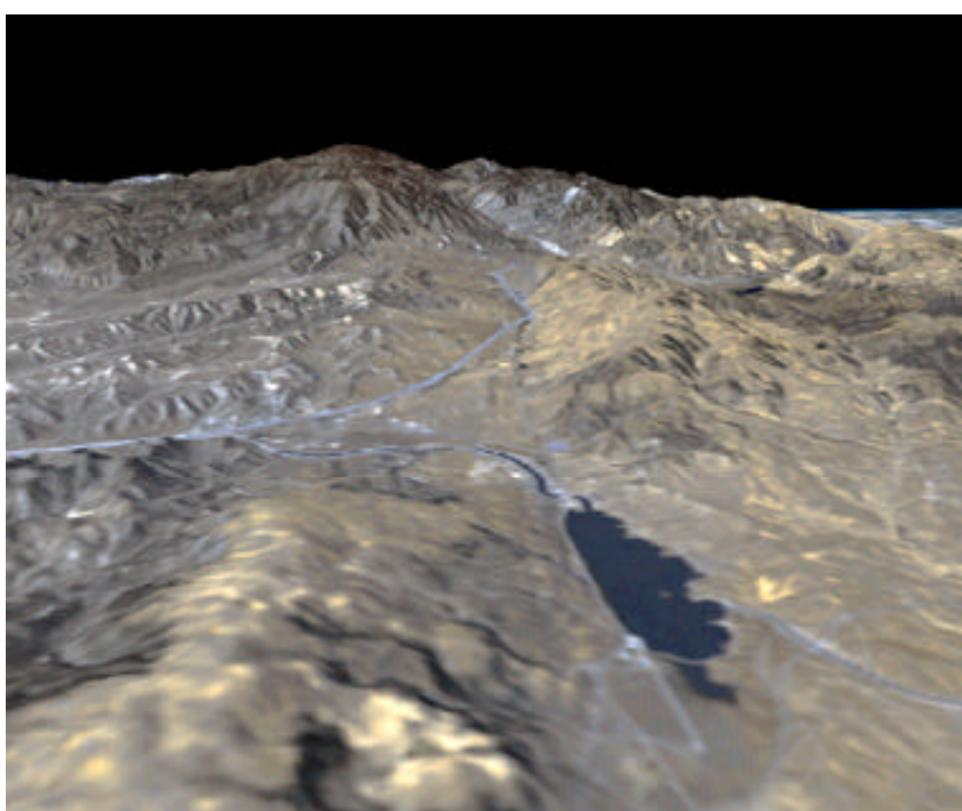
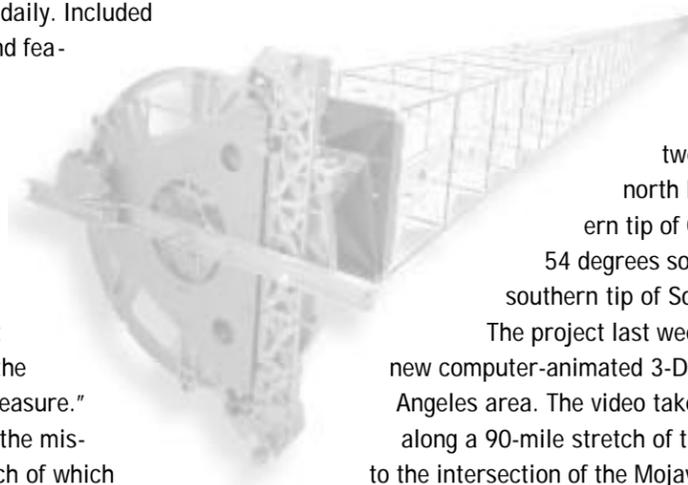
Two copies of each of the data tapes are now being copied for the mission archives.

The mission used a 60-meter long (200-foot) antenna boom—the largest structure ever extended from the shuttle—to gather mapping data over almost 80 percent of the total land mass of the

Earth. The mission covered 99.96 percent of the

target area, between 60 degrees north latitude (the southern tip of Greenland) and 54 degrees south latitude (the southern tip of South America).

The project last week also released a new computer-animated 3-D flyover of the Los Angeles area. The video takes viewers zooming along a 90-mile stretch of the San Andreas fault to the intersection of the Mojave Desert's Garlock fault, one of the region's greatest quake hazards. Stills from the video are online at <http://www.jpl.nasa.gov/pictures/srtm>.



Mission finds fault in radar image

This 3-D image created with data from JPL's Shuttle Radar Topography Mission prominently shows the San Andreas Fault at lower right. The data will be used by geologists studying fault dynamics and landforms resulting from active tectonics. This segment of the fault lies west of the city of Palmdale. Quail Lake Reservoir sits in the topographic depression created by past movement along the fault, which is the active tectonic boundary between the North American plate on the right and the Pacific plate on the left. Relative to each other, the Pacific plate is moving away from the viewer and the North American plate is moving toward the viewer along what geologists call a right lateral strike-slip fault. This area is at the junction of two large mountain ranges, the San Gabriel Mountains on the left and the Tehachapi Mountains on the right. Interstate 5 is the prominent linear feature starting at the left edge of the image and continuing into the fault zone, passing eventually over Tejon Pass into the Central Valley.



Service awards

Reminder

The Award for Excellence Ceremony will be held on May 11 at 2 p.m. in the mall. All employees are invited, but seating is limited. For information, visit the Reward and Recognition home page at <http://eais/sec614/reward>.

View this and previous issues of Universe online

<http://universe.jpl.nasa.gov>

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Notice to Advertisers

No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission.

Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

The following employees were first quarter 2000 recipients of Service Awards for 20 or more years of employment.

- 40 years:** Robert Leland, Anthony Pearson, William Spuck III.
35 years: Kenneth Bartos, Stephen Bridges, Gerald Humphrey, Donald Royer, Larry Simmons.
30 years: Thomas Bicknell, Richard Brace, Geraldine Bridges, Philip Callahan, Veronica Carter, Luis Constenla, Elaine Dobinson, Arthur Freiley, Gene Goltz, Dimitri Papanastassiou, Robert White.

- 25 years:** Peyton Bates, Robert Carlson, Roger Diehl, Michele Fowler, Fred Hammer, Lawrence Hawley, Michael Jahan, Terry Linick, Daniel McCleese, Stephen Slobin, Stephen Synnott, Harry Woo.
20 years: Juan Ayon, Janis Chodas, Elaine Corl, Cindy Cornish, Margaret Easter, Donald Ebbeler, Bruce Fischer, Sven Grenander, Gaylord Hammerwold, Walter Hoffman, Ann Ibaoven, William Imbriale, Robert Jarnot, Quiesup Kim, Violet Kitts, Anita Lacroix, Robert Leland, Todd Litwin, Mario Loo, Gregory Lyzenga, Jan Magee, Larry Meeks, Stephen Mitch-ell, Phillip Morton, Robert Nelson, Michael Nieto, Edith Nir, Carol Oken, Charles Presley, Phuong Reder, Betty Rippey, Socorro Shiraishi, Robert Spero, Jean Walker, Linda Worrel, Thomas Wynne.

NOVA awards

- The following employees were awarded JPL's Notable Organizational Value-Added (NOVA) awards in February:
Section 261: Mary Johnson, Kirk Bilby, Joseph Kelley, Wendelin Donahue, Stephen Mitchell, Patricia Parrett, Dan Low, Virginia Trester, Leslie Berridge.
Section 262: Michele Schneider, Robert Bertsch.
Section 263: James Curtis.
Section 265: Steve Simpson.
Section 314: Weni Chang, Paul Fieseler, Jerod Gross, Taifun O'Reilly, Jeanne Rademacher, Kathryn Schimmels, John Sisino, Reid Thomas, Steven Wissler.
Section 344: Greg Pixler.
Section 368: Joseph Witt, Harry Woo.
Section 387: Sunant Katanyoutanant, Steve Labrecque, Enrique Villegas.

- The following employees were awarded NOVAs in March:
Section 252: Mary Romejko.
Section 333: Richard Cirillo Jr.
Section 344: Annie Aroyan, Nanor Avedikian, Didier Keymeulen
 Alan Lee, Mohammad Mojarradi, Lori Slayton, Karl Strauss, Richard Williamson, Ricardo Zebulum.
Section 366: David Childs, Tommy Dearmond, David Gilliam, Robert Lubold, Ralph Ridley, William Seixas, Thomas Wolfe, Kaythya Zamora-Diaz.
Section 380: Jennifer Jubilado, Arthur Lane.
Section 383: Alireza Azizi, Stephen Guiwits, Peter Halverson, Philip Irwin, Denise Jones, Jennifer Logan, Elizabeth McKenney, Robert Spero.
Section 387: Michael Brenner.
Section 388: Robert Deen, Janet Fung.

Passings

GRACE LEMON, 78, a retired senior technical typist in the former Section 648, died of respiratory arrest March 24 at her home in Palm Desert. Lemon joined JPL in 1967 and retired in 1986. She is survived by five daughters and three sons. Services were held at Rose Hills MemorialPark in Whittier.

RAYMOND HUMMEL, 82, a retired security guard in Section 613, died of leukemia March 30. Hummel worked at the Lab from 1962-82. He is survived by three sons and five grandchildren. Private services were held in Porterville, Calif.

CAL PORTIS, 87, a retired maintenance electrician in the former Section 650, died of eliofemoral thrombosis March 31. Portis joined the Lab in 1966 and retired in 1979. He is survived by his daughter Marylyn, four grandchildren and four great grandchildren. Services were private.

Letters

The family of Malvin Yeater would like to thank his many friends at JPL for the flowers, cards and notes expressing sympathy to us at this difficult time. Your care and concern is appreciated.

Gladys Yeater

There are not enough words to express my appreciation to those of you who provided so much comfort and support during Bob's long illness and after his passing. I will cherish the memories of our picnics on the lawn outside Building 126; his 2 o'clock calls to see how my day was going; his practical jokes that he'd play on Facilities personnel; and his love for the work he did at JPL. Again, my sincerest thanks to all.

Susan Gilbert-Hagood

Bob Hagood was my friend and my cousin. He truly enjoyed his work at JPL and the people who worked with him. Thank you to all who have supported Susan and me through this very trying time. We miss him very much.

Judi (Hagood) Dedmon

Dear JPL friends: I wish to express my thanks and appreciation for your the kind words and thoughts given by my co-workers and friends on the passing of my grandmother. I would also like to thank the ERC for the thoughtful plant sent in her memory. Your sympathy and kindness is deeply appreciated.

Tracy Feehan

Classifieds

For Sale

- AMPLIFIER, Fender Blues deluxe tweed series, less than 1 hr. playtime, w/cover, \$375. 249-2357.
 AQUARIUM, seasoned saltwater, 30 gal., Eclipse II sys., black stand, heater, thermometer, filter, lights, \$400 as is, except for livestock, ready to go, substrate & live rock, or convert to fresh water. 583-4717, Gaby.
 BABY ITEMS: 3 car seats, basinette, clothes, etc.; FURNITURE: pics., stools, curtains, rugs,

- artifacts, vases, bedding, pillows, clothes. 626/398-1988, Beverly Drane.
 BABY ITEMS: crib w/matt., Child Craft, solid dark cherry, exc. cond., \$275/obo; BASSINETTE, Kolcraft Royal Suite, rocking, pop out casters, dark blue & white, exc. cond., \$75/obo. 626/397-7897.
 BEANIE BABIES/BUDDIES, buy whole set & save, \$5-\$20/obo. 661/288-1279, Patti Reed.
 BED, brass, ornamental, king sz. w/frame, \$100; BAKERS' RACK, custom-built for TV/stereo/speakers/etc., \$300; RADIOS, antique, free-standing, Stromberg-Carlson & Tempo Tune w/78 rpm record changer, 30s/40s era, \$1,000 ea./obo. 323/464-2762.
 BEDROOM SET, match. solid pine cargo 6-dr. chest, 2 side tables, king headboard, desk & shelf unit, \$500; SOFA, 7.5 ft., quality upholstery, off white, 12 decorator pillows, \$600; TABLE, oak drop-leaf w/4 chairs, \$125; STEREO CABINET, 80" solid walnut contemp. w/speakers, moving, \$125. 626/564-0168.
 BICYCLES, 2, 12-spd., \$30 & \$50; POOL PUMP, gas, 1.5" fire hose, \$35; LAMP w/shade, Czech. crystal, \$60; Honda CT110 Trail Bike, \$900; ROTO-TILLER, Massport, \$95; ENGINE STAND, prof. qual., \$95; TYPEWRITER, Olympia, elec. wide carriage, \$40; BEDROOM SET, dresser, end tables, lamps, dbl. sz. headboard & matt., \$335; CHAIR, cane-back, needs recaning, \$30. 790-7220.
 BREAD MACHINE, DAK, auto, cylindrical container, 1.5 lb. loaf, \$25/obo. 909/592-0780.
 CAGE, rabbit, conn. to winter quarters, water btls./food/misc, \$25. 952-8032.
 CAMERA, Leica Z2X compact, silver, date stamp, \$275. 626/795-8340.
 COUCH, beaut. mint green, white rattan armrests, camel back, exc. cond., like new, match. pillow, pd. \$800, sell \$400. 626/798-8071.
 FOOD PROCESSOR, Cuisinart, w/blades, exc. cond., pd. \$200, sell \$100. 626/798-8071.
 DINING/BREAKFAST NOOK, L-shape bench style w/storage, \$100. 249-6629.
 EXERCISER, Nordik Track Medalist ski-simulator, unused, orig. \$900, sell \$500/obo. 957-3022 eves.

- LAWN MOWERS, Honda, commercial snapper, 5 hp, gas eng., rear bag, \$300/obo; MOTOR, B&D, cordless, 3.5 hp, 2 yrs. old, \$150/obo. 626/584-3204 day, 909/592-0780 eve/wkend.
 LAWN MOWER, Kato Pro-Master 20" front-throw, reel-type pwr., oldie but goodie, recent tune, runs well, \$75/obo. 352-7321.
 LUGGAGE: hard-sided, men's Samsonite, dark brown, 27", \$30; 21", \$5; women's American Tourister, red, 27", \$40; 24", \$30; Bel-Aire, It. brown, 22", \$20. 626/577-8107.
 MISC.: microwave, Kenmore, lg. countertop, \$35; fan, standing, \$10; evaporative cooler, mobile, \$20; exercise climber, Precor 730e dual-action, \$100; lawnmower, B&D elect. rotary, \$20; tree trimmer, Wen elect., \$20; yard trimmer, B&D elect., bump-feed, moving, \$15. 626/564-0168.
 MISC.: Refrigerator, stove, table, chairs, sofa, misc. tools, garden, equip, old Singer sawing mac., 2 antique cooking stoves, furn., misc. clothes, leather skirt, suit, coat jacket sz. 7, beaut. 6 pc. French antique bedrm. set, head & foot board, 2 side night tables, vanity w/folding mirrors, armoire w/mirror, must see, sacrifice. 626/794-0455, Oli.
 MONITOR, 14" CTX VL400, max. res. 1024x768, 28mm, new in box, \$100/obo. 909/489-8305.
 MOVING SALE: washer & dryer, Whirlpool, \$300/pr.; refrigerator, side-by-side, 3 drs. access to ice/water/ice cubes, \$200; sofa, chairs, beds, etc. 409-9249.
 OPERA TICKETS, 2, Founders Circle, to Britten's Billy Budd, @ the L.A. Opera, Sat., June 3, 7:30 p.m., \$137/ea. 323/724-4365.
 ORGAN, Yamaha 415 elect. console, 13 pedals, 3 keyboards, 144 rhythm patterns, pd. \$7,500, sacrifice \$3,000; DIET TAPES, Jenny Craig, set of 14, \$50; POWER CONTROL CENTER for computer, 5 pwr. + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, \$20; SPRINK-LER VALVE ADAPTERS, Lawn Genie, model 756LG 3/4, new, \$10 ea. 790-3899.
 PIANO, bench, Wuriltzer, beaut., med. oak, full keyboard, living rm. qual., perfect cond., 10 yrs. old, \$1,800. 805/527-7017.
 POOL, Doughboy, 16' dia., great cond., ladder, pump, cover, access., \$1,500/obo. 249-9534.
 SOFA BED, \$150; TABLE, coffee, \$75; TV, color, \$75; AIR COMPRESSOR, \$100; FLOOR JACK, \$25, all exc. cond. 626/793-7879.
 SOFA & LOVE SEAT, qn. sleeper, \$200; TABLES, coffee/sofa & end, matching, oak/glass, \$100. 367-0969.
 SOFA, slip-covered, exc. cond., oatmeal background w/pale pink roses, 2 cush., 4 pillows, \$200. 626/794-8720 Andy or Lisa.
 SPEAKERS, vintage, JBL signature series, 12" mod. D131, 1-recone, 1-orig., \$180/pr. firm. 249-2357.
 STEREO, Honda stock, digital am/fm receiver, memory resets, cass./CD player compatible, \$15. 248-8103, Mike.

- STROLLER, Rite Start sit & ride tandem, \$90/obo; THULE RACK, \$35, photos of both at <http://go.to/~mj>. 661/263-2760, Mark.
 TABLE, work, folding, wall-mount/pull-down, hollow dr., 36"x80", hinged at 26"/54", 2 drop-down legs hidden in 54" fold-up pos., now bolted to 30"x5.5"x1.5" wood mount, exc. cond., \$25/obo. 909/593-4046 (La Verne).
 TABLES: maple, tea, \$100/obo; coffee, wicker, \$10; end, (2) wicker, \$10 ea.; round, whitewash, 4 chair, \$50; LAMPS, table, \$10 ea.; STEAMER/rice cooker, \$10; BLENDER, \$5; TABLE, . 661/288-2262.

Vehicles / Accessories

- '85 CADILLAC, 2-dr. hrdtop., 90K mi., clean, orig. owner, must sell, \$3,500. 909/593-7550 or 909/732-4482.
 '95 CHEVROLET truck, 5 spd., 2 dr., V6, std. cab, white, a/c, am/fm/CD, new speakers/clutch, bedliner, tow pkg., 82K mi., \$10,500/obo. 626/914-1044.
 '89 CHEVROLET Suburban, 3/4 ton, 4x4, hvy. duty tow pkg., "barn" drs., gd. cond., \$8,000. 626/337-1432.
 '96 DODGE Grand Caravan SE, teal, 3.3L auto, dual sliding drs., front/rear air, 63K, photos at <http://go.to/~mj>, \$12,450. 661/263-2760, Mark.
 '81 FIAT Spider 2000 conv., runs gd., all around gd. shape, \$2,250. 323/225-1732.
 '95 FORD Escort, 80,000 mi., 5 spd., exc. cond., \$5,500/obo. 957-5592.
 '95 FORD Mustang, 3.8L V6, 5 spd. manual, 52K mi., silver, a/c, pwr. everything, cc, stereo, CD/cass., dual airbags, no wrecks, \$8,300/obo. 249-0038.
 '83 HONDA dirt bike, model CR80R, new tires/tubes/fork seals, runs gd., current reg., \$500. 626/744-5378.
 '98 JEEP Grand Cherokee 4x4, auto, a/c, CD player, 10K mi., tow bar, s/r, very clean, \$15,500/obo. 982-9337.
 '97 JEEP Wrangler SE, red, 4WD, P/S, P/B, airbags, Kenwood stereo/cass., sound bar, Lo-Jack, ignition cut-off, 31"x10.5" tires, aly. rims, 25K mi., under transf. warr., exc. cond., \$14,250/obo. 248-8103, Mike.
 '97 NISSAN pickup 4x4 shortbed, diamond plate toolbox, bedliner, prem. whls., a/c, p/s, am/fm/CD ster. cust. paint, 4 cyl., 2.4L, 5 spd. manual, 55K mi., blue book April 2000 \$10,680/obo. 661/248-5285, Barbara Manhoff.
 '90 PONTIAC Grand Prix LE coupe, red/ silver, V6, auto, air, pwr. everything, tilt whl., s/r, aly. whls., 80K mi., gd. cond., \$4,300. 790-6952.
 '75 SEARS AL boat, 13' Evenrude, 10 hp, fish finder, trailer, \$550/obo. 661/724-1338.
 '89 TOYOTA Camry, white, 96K mi., exc. cond., a/c, auto, pwr. w/l/s, am/fm, cc, \$5,499. 626/579-7403.
 '82 VOLKSWAGEN camper, rebuilt eng., 1 owner, \$4,800. 626/281-8954.

Wanted

- BABYSITTER to care for 20 mo. old toddler at his Altadena home, M/W/F only, 8:30 a.m.-6 p.m. 626/791-0585, Ulvi or Ayse.
 GRADUATES, Belmont H.S., L.A., yrs. '57-'62. 956-1744, Barbara.
 ROOMMATE for charming old Tujunga house, 2 lg. bd. (hardwd. flrs.), lg. closets, 1 lg. ba., access to rest of house incl. kitch., laundry, offst. prking, yd.; seek prof., non-smoker, no pets; \$500 incl. util. 353-3568, Lorianne.
 SECURITY GATES, toddler, or light umbrella stroller. 626/794-2196.
 SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.
 TO RENT furn., 1 bd./studio from end of May to end of July, summer grad. student researcher. 303/492-8274, Moriba.Jah@Colorado.edu.
 VOLLEYBALL PLAYERS, coed, all levels of play, Tues. nts., 8-10, Eagle Rock H.S., \$3/nt. 956-1744, Barbara.

Free

- CAT, female calico, 8 mo. old, fixed, all shots, friendly, playful. 626/614-1012, 626/287-9433.
 DOG, German shepherd, 5 yr. old neutered male needs gd. home, obedience trained, loves people/children, dislikes cats, requires very secure yard. 626/798-6248.
 DOG, Lab mix puppy, black, female, 8 mo. old, found abandoned in apt., cat friendly, all shots, house trained, smart, great family pet, to gd. home. 626/614-1012, 626/287-9433.
 HAMSTER, female, 3 mos. old, brown/white, cage incl. 790-7934.

For Rent

- ALTADENA condo lease, 2 bd., 1 3/4 ba., mins./JPL, nice closets w/organizers, f/p, c/a, comm. pool, storage rm., 2 car gar., carport,

- tile counter top & marble flr. in kitch., lg. patio, landscape: planters/oriental garden/waterfall/ spa, end unit, wins. on 3 sides, \$1,200, by owner. 626/398-1988, Beverly Drane.
 ALTADENA, 3 bd., 2 ba., executive home, pool, \$1,450. 626/793-2686, Ms. Crisp.
 LA CRESCENTA house, above Foothill Blvd., 3 bd., 1 1/2 ba., formal dining rm., breakfast area, f/p, fenced yd., detached 2-car gar., near library/schools, fairly new paint, gardener pd., \$1,300 security dep. 626/585-5313, Yue-Hsin Chen.
 S. PASADENA, fully furn. studio apt., nice area, 1718 Huntington Dr., btwn. Marengo & Milan Sts., car space, laundry fac., no smoke/pets, util. pd., \$565. 626/792-9053, Marilyn.
 SYLMAR, dream rent/buy option, 4 bd., 3 1/2 ba., 11 rms., 2,500 sq. ft., f/p, Jacuzzi tub in master ba., comm. pool, 20 mi. from JPL, use 3 mos. rent to pay closing, \$2,500. 626/584-6526, Fred.
 TUJUNGA, 2 lg. bd. & ba. in charming old house; access to rest of house incl. kitch., laundry, offst. prking, yd.; seek prof., non-smoker, no pets; \$500/single, \$600/couple, incl. util. 353-3568, Lorianne.

Real Estate

- LA CANADA, 4 bd., 2 ba., c/a, LC schools, '96 remodel, walk-in closets, newly painted, move-in ready, \$435K. 952-2581.
 LA CRESCENTA, 4 bd., 4 ba., 2,150 sq. ft. house, upstairs master suite, f/p, c/a, 2-car gar., lemon/plum trees, quiet nbhd., 5 mi./JPL, gd. nearby schools, photos at home.earthlink.net/~lydlar, seek 7/1 closing, \$425K. 957-3022 eves.
 LA CRESCENTA, 2-story, 5 bd., 2.75 ba., mtn./city vw, h/w flr., marble f/p, 2,196 sq. ft. liv. space, 500 sq. ft. encl. patios for den/fam. rm., 7,800 sq.ft. backyd., grass/8 fruit trees, front & backyd gardens/sprinklers, c/a/h, newer d/w, Gld. schools, newer roof, 2-car attach. gar., \$449K/obo. 249-2889.
 PASADENA bungalow home, near JPL/ Caltech, f/p, wd. flr., nice kitch., lots storage, master bd., full ba., laundry rm., huge gar. w/working shop area, huge backyd, fruit trees/flowers, see to appreciate, as is, \$185,000. 626/794-0455, Ollie or Bill.
 PASADENA, executive condo, total remodel, 2 bd., 2 ba., 1,200 sq. ft., new kitch., h/w din. rm. floors, newer carpet/paint, top unit in park-like setting, walk to Caltech/Lake Ave., nice pool/spa, \$198K. 626/585-9048.

Vacation Rentals

- BIG BEAR cabin, walk to village, 2 bd., slps. 8, compl. furn., f/p, TV/VCR, \$75/nt. 249-8515.
 BIG BEAR LAKE cabin, nr. lake, shops, village, forest trails, 2 bd., slps. up to 6, f/p, TV, VCR, phone, microw., BBQ, more, JPL disc. from \$65/nt. 909/210-9182.
 BIG BEAR LAKEFRONT, lux. townhome, 2 decks, tennis, pool/spa, near skiing, beaut. master bd. suite, sleeps 6. 949/786-6548.
 HAWAII, Maui condo, NW coast, on beach w/ocean vw., 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microw., d/w, pool, priv. lanai, slps. 4, 4/15-12/14 rate \$100/nite/2, 12/15-4/14 rate \$115/nite/2, \$10/nite add'l. person. 949/348-8047.
 LAKE TAHOE, north shore, 2 bd., 2-1/2 ba., sleeps 6-7, private sandy beach, pool, great loc., all amenities, hike/golf/fish, 2 mi. to casinos, JPL disc. summer wkly rate, \$650. 626/355-3886, Rosemary or Ed.
 MAMMOTH, Chamonix condo, at lifts 7, 8, 16, 17; walk to Warming Hut, 2 bd., 2 full ba., sleeps 6, fully equip. elec. kitch. w/microw. & extras, f/p & wood, color TV, VCR, cable, FM stereo, pool & sun area, o/d Jacuzzi's, sauna, game, rec. & laundry rms, play & BBQ areas, convenient to hiking, slopes/lifts/shops/ events, summer rates begin May. 249-8524.
 MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equip. kitch. incl. microw., d/w, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL disc. 626/798-9222 or 626/794-0455.
 OCEANSIDE, on the sand, charming 1-bd. condo, panoramic view, walk to pier/harbor, pool/spa, game rm., sleeps 4. 949/786-6548.
 PACIFIC GROVE house, 3 bd., 2 ba., f/p, cable TV/VCR, ster./CD, well-eqpd. kitch. w/microw, beaut. furn., close to golf, bches., 17 Mile Dr, Aquar., Cannery Row. JPL disc. 626/441-3265.
 ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.
 SAN FRAN., Nob Hill honeymoon suite, slps. 2 max., full kitch., maid serv., concierge: \$125/nt.; \$750/wk., reserve early. 626/254-1550.
 S. LAKE TAHOE KEYS waterfront, 4 bd., 3 ba., 1 bd. & liv. rm. upstairs, hcp. access fair, slps. 12+, f/p/s, decks, gourmet kitch., boats, TVs, VCR, stereo, in & d/d pools, bch., tennis, 10 min./ski/casinos/golf; wine co., 3-day min., \$1,195/wk. [1 June-15 Sept; 22 Nov-1 April], \$595/wk. low seas., + \$90 clean fee. 949/515-5812.